

ABSTRACT OF THE DISCLOSURE

Sol-gel chemistry is used for the preparation of energetic materials (explosives, propellants and pyrotechnics) with improved homogeneity, and/or which can be cast to near-net shape, and/or made into precision molding powders. The sol-gel method is a synthetic chemical process where reactive monomers are mixed into a solution, polymerization occurs leading to a highly cross-linked three dimensional solid network resulting in a gel. The energetic materials can be incorporated during the formation of the solution or during the gel stage of the process. The composition, pore, and primary particle sizes, gel time, surface areas, and density may be tailored and controlled by the solution chemistry. The gel is then dried using supercritical extraction to produce a highly porous low density aerogel or by controlled slow evaporation to produce a xerogel. Applying stress during the extraction phase can result in high density materials. Thus, the sol-gel method can be used for precision detonator explosive manufacturing as well as producing precision explosives, propellants, and pyrotechnics, along with high power composite energetic materials.